

Benefits and Limitations of Age Group-Adjusted Average in the Profitability Audit for Pharmacotherapy

Reinhard Schuster^{1,*}, Thomas Ostermann^{2,†}, Timo Emcke^{3,‡} and Fabian Schuster^{1,4,§}

¹Department of Health Economics, Epidemiology and Medical Informatics, Medical Advisory Board of Statutory Health Insurance in Northern Germany (MD Nord), 23554 Lübeck, Germany

²Department of Research Methodology and Statistics in Psychology, Witten/Herdecke University, 58448 Witten, Germany

³Department of Prescription Analysis, Association of Statutory Health Insurance Physicians, 23812 Bad Segeberg, Germany

⁴Sigmund-Freud-PrivatUniversity SFU Vienna, Faculty of Law, 1020 Vienna

Keywords: Drug Prescriptions in Outpatient Treatment, Statutory Health Insurance in Germany, Sickness (Health Insurance) SHI Funds in Germany, Morbidity Related Groups (MRG), Risk Structure Compensation between the Health Insurance Companies (RSC), Gini Coefficients, Lorenz Curves.

Abstract: Benchmarks for pharmaceuticals have been used for over 25 years to limit the cost increase in the second largest cost block in statutory health insurance in Germany with financial punishments for the physicians. The Regional Social Court of Dresden declares such a payback practice to be inadmissible if no age reference is used. In 2016, in most regions of the statutory health insurance associations, the division into status groups members, family members and pensioners has been changed into four age groups. The Supply Strengthening Act has opened up the possibility of drafting regional agreements. In Schleswig-Holstein, Morbidity Related Groups (MRG) were introduced for morbidity-related considerations. A number of other regions are currently using retrospective average cost limitations, which have the same problems as the benchmark restrictions. The aim of this paper is to investigate the influence of the type of health insurance (sickness) fund on the benchmark result with status and with age groups. Different morbidity structures between the health insurance funds are the subject of the risk structure compensation. For doctors, this aspect is not given sufficient consideration with respect to patient-specific morbidity characteristics till now.

1 INTRODUCTION

Drug prescriptions in outpatient treatment of SHI (statutory health insurance) physicians are subject to the economic efficiency requirement according to German Law with respect to §§ 2 and 12 SGB V. This means that all drug treatments that are provided in the statutory medical practice must be sufficient, appropriate and economical and that what is necessary must not be exceeded. A control instrument that has been used for a long time was the so called “Richtgrößen” benchmark, cf. (Busse et. al., 2015), (Bratzke et. al., 2012). Based on the average actual situation in the SHI-insured groups M (members), F

(family members) and pensioners (R) as well as the expenditure volume determined in negotiations between the contracting parties (health insurance companies and the Association of Statutory Health Insurance Physicians), benchmarks were set for assessing the drug expenditure. Depending on the negotiation region, drugs were removed from the restrictions if it should be assumed that their prescription was not inefficient („Anlage-Präparate”, “drug contract annex”). In December 2013, the Dresden Social Court considered exams to be unlawful because there were no age-related patient groups. The Federal Social Court ruled in June 2013 that the review committees have a duty to investigate atypical prescription cases. Since they had data on the

* <https://md-nord.de>

† <https://uni-wh.de>

‡ <https://kvsh.de>

§ <https://sfu.ac.at>

doctor to be examined and the comparison group, they would have to investigate deviations and discuss the reasons with the doctor. These judgments are a step towards morbidity-related considerations, cf. (Urt. LSG Sachsen-Anhalt, 2014), (Urt. BSG Juni, 2013), (Urt. SG Dresden, 2013), (GKV-Versorgungstärkungsgesetz, 2015), (Gottwald, 2015), (Korzilius, 2015), (Sinowatz, 2015), (Wersborg, 2006). As will be described in more detail below, there are data in the big data environment, which results opportunities and difficulties for doctors, negotiators and examination boards.

In (Schuster et. al., 2016) the influence of the changeover from the status groups to the age groups 0-15 years, 16-49 years, 50-64 years and 65 years of the patients and over on the database 3/2014 - 2/2015 as a first calculation and a second calculation for the first two quarters of 2018 for Schleswig was examined. One way of assessing the fairness of the changeover is to compare the subdivision only according to status groups or only according to age groups with a combined view. Morbidity-related misjudgments that occur in the combined groups are not recorded.

The combination of patient members and age group 16-49 years, with 30.7% of patients, which is the strongest combination among general practitioners, is assessed by the age assessment almost as in the combination of status group and age, so that the age groups appear fair from a combination perspective. But they lose 37% of their benchmark drug volume according to status groups. In the third largest combination group of members and ages 50-64, this group was underrated by 29% according to status group and 12% overrated according to age group.

The comparison of the benchmark fulfillment according to status and age groups results in a correlation coefficient R^2 between 0.9724 for pediatricians and 0.9999 for hematologists/oncologists and rheumatologists, for the largest group of general practitioners it is 0.9784. The rather rough age division into only four groups had a much smaller effect in terms of a fairer assessment than was expected from the court judgments examined. The main points of criticism in the grounds for the judgment therefore remain. that papers in a technically unsuitable form will be returned for retyping. After returned the manuscript must be appropriately modified.

In Schleswig-Holstein, the pharmaceutical partnership agreement between the SHI physician organization and the SHI funds for 2017 was changed to Morbidity Related Groups (MRG), cf. Emcke

et.al., 2017), (Prüfvereinbarung, 2016), (Schuster et. Al., 2017), (Schuster et. al. ,2016). The relationship to morbidity is established on the basis of the prescribed drugs and the active substance classification (international ATC classification) and not on the basis of the diagnostic data (international ICD classification). The relationship between MRG and ICD diagnoses is examined in (Schuster et. al., 2017), (Schuster et. al. 2017). Diagnostic data are only available on a quarterly basis, prescription data according to Section 300 SGB V have a prescription date. The diagnostic data differentiate between acute illness and permanent diagnosis, but there is no main diagnosis like in the inpatient area.

The active ingredient classification is based on the international ATC (anatomical-therapeutic-chemical) classification with national characteristics on the basis of drug approval law. The MRG classification has analogies to the Diagnoses Related Groups (DRG) in the inpatient area, but does not serve to reimburse medical services. For MRG, the patient and his entire morbidity are the focus of considerations. For each quarter and medical specialty, the drug group at the level of the ATC four-digit code with the highest costs is selected as dominating for the patient. For all patients in this base group, it is considered how age in 5-year steps, multimorbidity in the sense of multi-medication and prescription intensity affect the average costs in a comparison of specialist groups. On this basis, a prospective guaranteed value for its pharmaceutical expenditure is first determined for each doctor. If the morbidity of the patients or their number increases in the prescription year, the guaranteed value will increase. With this approach, particularities in practice are generally well captured. A fair assessment is achieved if all doctors and all patients are included in the evaluations. The MRG concept for general assessment is supplemented by a drug agreement in which specific control effects are to be achieved in selected areas.

In the following, it will be examined to what extent the morbidity differences occurring in the types of health insurance funds influence the results of profitability analyzes. This also includes the question of the extent to which a doctor bears an increased or decreased risk of exams due to the different structure of the insurance type of the patients with regard to the health insurance companies. In order to counteract the different morbidity of the insured persons, there is a risk structure compensation between the health insurance companies (RSC). In relation to a doctor, this has not been considered for benchmarks and average values. In the MRG system, such differences are taken into account in the case

groups. In contrast, morbidity differences are essentially not taken into account in drug agreements. Differences in the distribution are to be examined with Gini coefficients for Lorenz curves.

2 MATERIAL AND METHODS

We analyze all treatments and prescriptions of physicians for patients of the statutory health insurance (SHI) by SHI physicians in Schleswig-Holstein in the first and second quarter of 2018. The datasets of all treatments and prescriptions of all physicians with respect to a patient are used. The dataset of the second quarter of 2018 covers around 1,700,000 patients with diagnoses and around 1,400,000 patients with drug prescriptions using a pseudonymized patient identity with age, gender and insurance fund information. We utilize the International Statistical Classification of Diseases and Related Health Problems [ICD]. The knowledge of the total number of patients is a side-effect of the diagnose statistic. The same diagnoses for the same patient by different physicians are counted repeatedly, if the analysis is aimed for drug economy with respect to physicians, with respect to epidemiologic analysis it can be more adequate to analyze all diagnoses and treatments for a patient with respect to all physicians. For prescription analysis the International Anatomic Therapeutic Chemical (ATC) classification system with German specifications provided by the German Institute of Medical Documentation and Information (DIMDI) is used.

Statutory health insurance (SHI) in Germany through sickness funds is compulsory for workers whose gross income does not exceed a certain level, for unemployed and retired people, and for certain other population groups (such as farmers, artists, and students). Employees with incomes above the threshold may be voluntary sickness fund members if they have been members before. Around 88 percent of the total population in Germany is covered by the SHI (74 percent obligatorily and 14 percent voluntarily).

Sickness (health insurance) SHI funds in Germany are differentiated into the following types:

- general regional funds (Ortskrankenkassen AOK)
- substitute funds (Ersatzkassen, VdEK)
- company-based funds (Betriebskrankenkassen, BKK)
- guild funds (Innungskrankenkassen, IKK)

- farmers funds (Landwirtschaftliche Krankenkassen, LKK)
- miners fund (Bundesknappschaft, BKN)
- sailors fund (See-Krankenkasse, SEE).

All funds have a not-for-profit status and are based on the principle of self-government. Miners fund and sailors fund are merged now.

To avoid having all insured people choose funds with a low contribution rate because of a historically good risk profile a risk structure compensation (RSC) scheme was introduced on the level of funds. But a risk compensation on the level of physicians with respect to drug economic considerations which can lead to paying-back regulations for the doctors was not established.

The health funds and each regional association of SHI physicians set target volumes for physicians in each medical specialty in annual negotiations. These correspond to the average prescription volume per calendar quarter for each specialty which may be done with prospective and with retrospective considerations. SHI physicians who exceed their individual target limit by more than 15% with regional exceptions related to medicines and patients may be advised in writing to critically reconsider their prescription behaviour to the joint examination office of the SHI association and the health insurance funds. The SHI-limit for overprescribing and paying-back has been set at 125% of the individual target. Those physicians who exceed the target by 25% are asked to justify the overprescription although this would actually already be possible to a considerable extent on the basis of the data records available in the examination office. If their arguments are rejected, they are subject to recourse and usually pay back the difference between the overprescribed amount and 115% of the target.

In the discussion between the doctors and the examining body, the doctors have a lack of information because they know their own prescriptions but not those of their specialist group. Ideally, this is balanced out by joint advisory services by the SHI association and the health insurance funds.

With regard to the doctors, this justification procedure sometimes delivers very different results, depending on whether one adjusts for status groups or age groups. If you look at the more than half a million different drugs according to the product designation (pharmaceutical central number, PZN) and the widely spread diagnosis according to ICD, in connection with the specified number of patients, one can see that it situated in the big data environment.

The KM6 statistics of the statutory health insurance companies describe the number of insured persons at the annual mean. Population statistics are based on the status at the end of the year. From the difference between the two, one can deduce the proportion of persons SHI-insured with a certain degree of accuracy.

Costs per patients are used for benchmark calculations and average value checks. The point of reference here are the medical treatment cases, this also includes those patients without medication prescriptions, which can be calculated by the ICD statistic. Alternatively, prescription patients (i.e. only patients with drug prescriptions) or all SHI-insured persons can be used, with advantages and disadvantages. The choice of all patients as a reference point is intended to support the limitation of minor prescriptions. In the MRG system, the prescription patients are the reference point. Since comparisons are made based on morbidity, the “thinner problem” (patients with few cheap drugs) is not an obstacle due to regulations. In the case of regional morbidity analyzes, the insured person's reference (in relation to statutory health insurance, GKV) is relevant. This is different from the population reference. The information provided by insured persons is available with the KM6 statistics differentiated according to federal state and type of insurance fund (insurance members in month 6, middle of the year). Unfortunately, the reference point is the middle of the year, as opposed to the majority of population statistics which refer to the end of the year.

The script languages gawk and perl were used for the calculations. These were carried out for a joint working group of the health insurance companies and the Association of Statutory Health Insurance Physicians with their drug billing data for the second quarter of 2018.

3 COSTS PER CASE AND COST SHARES ACCORDING TO TYPE OF INSURANCE

Age information is only available for the age group 0-14 and then in 5-year steps up to 89 years and a group from 90. This means that the age and gender-related share of statutory health insurance insured persons can only be estimated with a higher resolution using interpolation methods, cf. Figure 1.

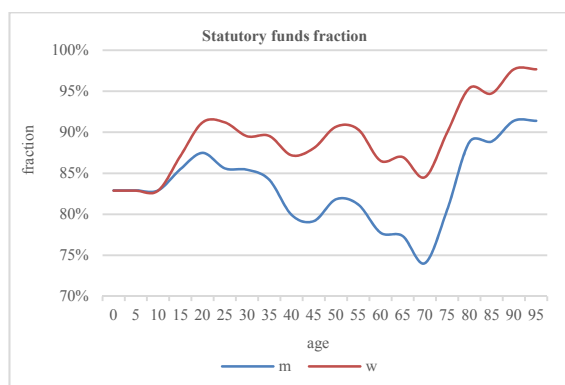


Figure 1: Age and gender-dependent proportion of GKV insured persons in Schleswig-Holstein (man = m, woman = w).

There was a particularly high proportion of privately insured persons in the low-birth year 1945, at the height of the baby boom a (locally) minimal and then at the point of the pill break again a (locally) maximal proportion of privately insured persons. In connection with the higher average social status of privately insured persons compared with those with statutory health insurance, a lower risk of morbidity is to be expected. The gender-specific proportion of people insured with statutory health insurance can also result in differences in morbidity when looking at the insured person or the number of cases. Population models over long periods of time are considered in (Schuster et al., 2017).

Figure 2 gives an overview of the gender-differentiated influence of age in annual resolution on the average case costs for general medicine depending on the types of insurance.

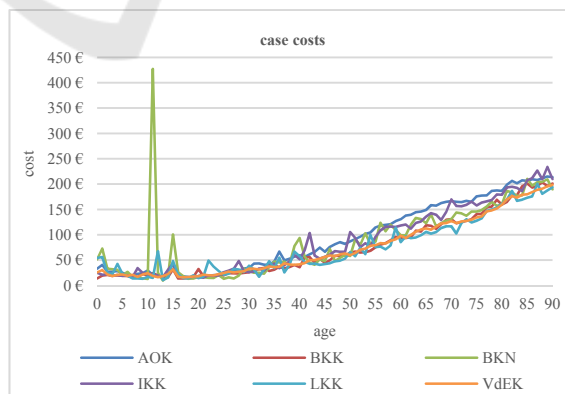


Figure 2: Case costs according to type of insurance.

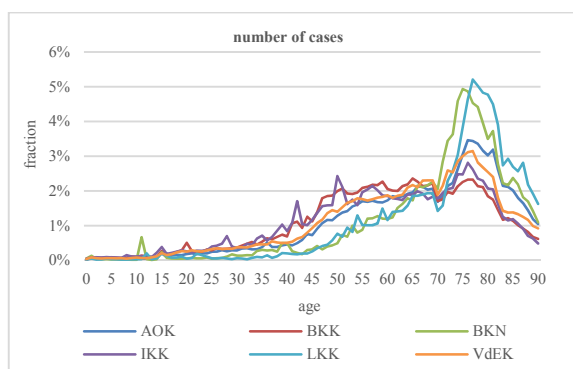


Figure 3: Number of cases according to health.

Figure 3 shows the number of cases that are specific to the health insurance scheme, which represent the age structures of the patients relevant to treatment. The importance of the risk structure compensation for the health insurance funds is clearly evident here, but also that certain areas are of considerable importance within age groups.

4 LORENZ CURVES AND GINI COEFFICIENTS

As an example, we consider in Table 1 the mean case costs in the age group 0-14 years, depending on the type of health insurance, as well as the associated cumulative patient and cost shares.

Table 1: Case costs, cumulative patient and cost shares according to insurance fund.

| Fund type | Case costs € | pat.-frac.cum. (%) | Cost-part.cum. (%) |
|-----------|--------------|--------------------|--------------------|
| 2 | 34,35 | 17,99 | 13,58 |
| 5 | 36,93 | 26,01 | 20,10 |
| 6 | 40,93 | 71,45 | 60,98 |
| 3 | 55,10 | 72,87 | 62,70 |
| 4 | 61,47 | 99,19 | 98,27 |
| 1 | 97,40 | 100,00 | 100,00 |

This gives us a corresponding Lorenz curve in Figure 4 with the Gini coefficient 0.12 (area between the curve determined by patient and cost shares and the diagonal; alternatively, a normalization with a factor of 2 between the curves is used in the literature).

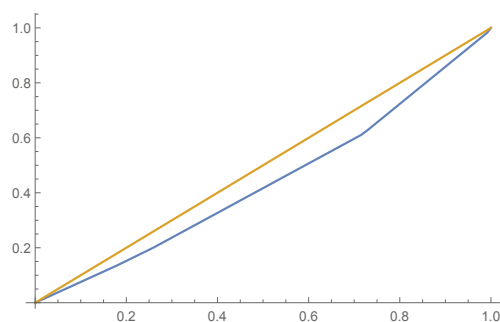


Figure 4: Lorenz curve for patient and cost shares in the age group 0-14 years with the proportion of patients on the vertical axis and the proportion of costs on the horizontal axis.

For the Gini coefficients of the specialist groups, there are clear differences with regard to the types of health insurance fund, cf. Table 2.

Table 2: Gini coefficients for the type of health insurance for medical specialty group.

| Gini coefficient (%) | medical specialty group |
|----------------------|--|
| 1,02 | Oral, maxillofacial and facial surgeons |
| 1,42 | Internists (pulmonology) |
| 3,17 | Pediatricians |
| 3,41 | Child / adolescent psychiatrist |
| 3,94 | Dermatologists |
| 4,10 | Internists (hematology / oncology) |
| 4,49 | Ophthalmologists |
| 4,67 | Gynecologists |
| 4,97 | Internists (rheumatology) |
| 5,02 | Surgeons |
| 5,41 | Urologist |
| 5,61 | ENT doctors |
| 5,72 | Internists (cardiology) |
| 5,94 | Orthopedists |
| 6,19 | Neurology / Neurology |
| 7,45 | Anesthetists |
| 8,94 | General practitioners |
| 8,94 | Radiologists |
| 9,08 | Psychiatry and psychotherapy / neurology |
| 10,02 | Internists (nephrology) |
| 10,62 | Internists (specialists) |
| 10,64 | Medical psychotherapists |
| 11,32 | Internists (gastroenterology) |
| 13,50 | Internists (endocrinology) |
| 24,14 | Radiation therapists |

For The smallest differences in costs with regard to the types of insurance are next to the small specialist group of oral and maxillofacial surgeons for pulmonologists and paediatricians. Gastroentero-

logists and radiation therapists have the greatest cost differentiation with regard to the type of health insurance. The General practitioners are in the middle.

5 DISCUSSION AND CONCLUSION

The considerable influence of the type of insurance funds on the cost structure makes it clear that case costs specific to age groups should be used depending on the type of insurance fund. This approach describes a morbidity-related risk structure compensation for the physician. The application of the risk structure compensation (RSC, Morbi-RSA), which is common for health funds, to doctors appears to be a necessary consequence. As an example, consider in Table 3 the effects at the upper and lower limit points for general practitioners.

Table 3: Profitability evaluation with and without risk structure compensation (RSC) for the doctor.

| Physician | with Compensation for morbidity (€) | without Compensation for morbidity (€) | Over- / under-payment (%) | result (%) |
|-----------|-------------------------------------|--|---------------------------|------------|
| 1 | 1.534,91 | 1.346,52 | 87,73 | 114 |
| 2 | 533.128,00 | 473.200,02 | 88,76 | 113 |
| 3 | 55.261,27 | 49.869,03 | 90,24 | 111 |
| 4 | 715.327,48 | 656.349,11 | 91,76 | 109 |
| 5 | 631.481,05 | 579.615,71 | 91,79 | 109 |
| 6 | 138.328,83 | 127.563,42 | 92,22 | 108 |
| 7 | 353.775,03 | 326.719,76 | 92,35 | 108 |
| 8 | 254.136,29 | 236.049,46 | 92,88 | 108 |
| 9 | 356.234,76 | 331.451,26 | 93,04 | 107 |
| 10 | 259.817,72 | 241.763,38 | 93,05 | 107 |
| ... | ... | ... | ... | ... |
| 1.203 | 369.268,96 | 398.390,82 | 107,89 | 93 |
| 1.204 | 266.444,41 | 287.501,12 | 107,90 | 93 |
| 1.205 | 160.722,60 | 173.465,69 | 107,93 | 93 |
| 1.206 | 215.969,65 | 234.045,34 | 108,37 | 92 |
| 1.207 | 35.858,68 | 38.910,51 | 108,51 | 92 |
| 1.208 | 227.612,77 | 247.060,47 | 108,54 | 92 |
| 1.209 | 103.938,17 | 113.090,71 | 108,81 | 92 |
| 1.210 | 104.004,85 | 114.433,94 | 110,03 | 91 |
| 1.211 | 3.410,21 | 3.766,44 | 110,45 | 91 |
| 1.212 | 52.584,56 | 58.213,02 | 110,70 | 90 |

Failure to take account of the type of health fund with a view to compensating for morbidity ranges from a disadvantage of 14% to an advantage of 10% for general practitioners, whereby the drug costs

involved are also very different. Large amounts play a role in both the upward and downward deviations.

In the case of benchmark and average restrictions, an excess of 25% can trigger a pay-back procedure (if the physician is included permanent in the contractually agreed sample). If 14% of these cases it can already be due to the insurance fund (disadvantage due to the patient structure), it seems advisable to take insurance fund into account. Table 4 shows the budget overrun with and without insurance dependent compensation for morbidity.

Table 4: Deviances in the profitability evaluation with and without morbidity risk structure compensation (RSC) for the doctor.

| medical speciality group | Physician | Drug costs (€) | Budget overrun with Compensation for morbidity (%) | Budget overrun without Compensation for morbidity (%) |
|--------------------------|-----------|----------------|--|---|
| GP | 1 | 532.498,04 | 123,7 | 131,4 |
| GP | 2 | 713.782,57 | 123,4 | 125,4 |
| GP | 3 | 715.327,48 | 118,5 | 129,2 |
| GP | 4 | 652.004,87 | 123,4 | 125,9 |
| GP | 5 | 350.017,51 | 124,9 | 127,1 |
| GP | 6 | 189.596,78 | 122,6 | 125,0 |
| GP | 7 | 17.059,82 | 119,3 | 126,2 |
| GP | 8 | 610.218,21 | 122,8 | 126,3 |
| GP | 9 | 854.378,71 | 122,6 | 125,7 |
| Anesthetists | 10 | 937.725,13 | 124,5 | 126,4 |
| Gynecologists | 11 | 1.040.364,55 | 124,6 | 125,5 |
| Urologist | 12 | 295.275,67 | 123,1 | 125,3 |
| Internists | 13 | 289.871,33 | 122,0 | 131,0 |
| Internists | 14 | 341.535,80 | 118,5 | 126,4 |

Depending on the starting point in the calculation that is not adjusted for the type of health insurance fund, the 25% range will then be exceeded. In the period under review (first calculation), there were 14 physicians that would not come into the area of pay-back with morbidity adjustment with regard to the health fund using the age group adjustment, but would fall into the anomaly area without the additional adjustment with respect to the health insurance fund.

The problems presented do not occur when the MRG model is used. The problems presented do not occur when the MRG model is used. If, however, economic feasibility analyzes are carried out without prescription-related morbidity evaluations, an additional adjustment of the type of health insurance

provider is required in addition to the age group adjustment in order to meet the conditions required in the social court judgments cited above.

Till 2020 in the majority of the federal states in Germany (more precisely: in the regions of the Association of Statutory Health Insurance Physicians SHI), the economic feasibility studies with regard to the drug prescriptions were carried out with the help of the discussed problematic benchmarks and average calculations. The service providers (doctors) are largely satisfied with this because the limits of the problematic sanctions (pay-back) have been significantly increased. This evaluation largely (with the exception of the exceptions discussed) contains all drug prescriptions, which leads to a fairness between the doctors. The necessary increase in equity for doctors with regard to the membership of their patients in the health insurance funds was not implemented in a single German region. In some federal states, the economic feasibility study has been switched to target agreements, which only include a certain part of the drug ordinances and thus leads to a limited degree of justice between doctors. Target agreements have a normative character and only take regional characteristics into account to a certain extent. In Schleswig-Holstein, in addition to a target agreement with a compensatory effect, an MRG (morbidity related groups) analysis was carried out in 2020, in which patient-centered features regarding the diseases and the prescribed drugs were taken into account and thus a risk compensation with regard to the health insurance companies was fully implemented. For the most part, the fairness of the examination for doctors with regard to health insurance companies has not yet been adequately resolved.

REFERENCES

- Busse, R., Panteli D., Henschke C. (2015). *Arzneimittelversorgung in der GKV und 15 anderen europäischen Gesundheitssystemen: Ein systematischer Vergleich*, Universitätsverlag der TU Berlin.
- Bratzke, Spies, Krebs (2012). *Morbiditätskomponente bei Arznei- und Heilmittelbudgets einführen*, Deutsche Ärztetag 2012, Drucksache V I – 37.
- Emcke, T., Ostermann, Th., Heidbreder, M., Schuster, R. (2017). *Comparison of Different Implementations of a Process Limiting Pharmaceutical Expenditures Required by German Law*. Proceedings of HealthInf.
- GKV-Versorgungsstärkungsgesetz (GKV-VSG) (2015). BGBl. I S. 1211, 2015
- Gottwald, N. (2015). *Damoklesschwert Richtgrößenprüfung. Im Dschungel der 25-Prozent-Regel*, HNO-Nachrichten, Springer.
- Korzilius, H. (2015). *Arzneimittelrichtgrößen, Ärzte sollen angstfrei verordnen*, Dtsch Arztebl 112.
- Ostermann, Th., R.Schuster, R. (2015). *An Information-theoretical Approach to Classify Hospitals with Respect to Their Diagnostic Diversity using Shannon's Entropy*. HealthInf.
- Prüfvereinbarung (2016). Prüfvereinbarung gemäß §§ 106 Abs. 1, 106a Abs. 4 und 106b Abs. 1 SGB V wischender Kassenärztlichen Vereinigung Schleswig-Holstein (KVSH), Bad Segeberg und den Krankenkassen(-verbänden). www.kvsh.de.
- Schuster, F., Ostermann, Th., Schuster R., Emcke, T. (2017). *Deviations in Birth Rates with Respect to the Day of the Week and the Month for a 100 Year Period Regarding Social and Medical Aspects in Explaining Models*. Proceedings of HealthInf.
- Schuster, F., Ostermann, Th., Emcke, T. (2017). *Age and Gender Structures for ICD 10 Diagnoses in Outpatient Treatment using Shannon Entropy*, GMDs, German Medical Science.
- Schuster, R. (2015). *Morbidity Related Groups (MRG) and drug economic efficiency index - a new concept after the age of "Richtgrößen" benchmarks in Germany*, GAA-Jahrestagung, German Medical Science.
- Schuster, R., Heidbreder, M., Emcke, T. (2017). *Relations of Morbidity Related Groups (MRG), ICD 10 diagnoses and age structures in outpatient treatment*. GMDs, German Medical Science.
- Schuster, R., Emcke, T., Arnstedt, E.v., Heidbreder M. (2016). *Morbidity Related Groups (MRG) for epidemiological analysis in outpatient treatment*, IOS Press 783-787.
- Schuster, R., Emcke, T., Schuster, F. (2016). *Vergleich der Richtgrößenauswertungen für Arzneimittel im Vertragsärztlichen Bereich mit Statusgruppen und Altersgruppen*. GMDs-Jahrestagung, German Medical Science.
- Sinowatz F. (2015). *Ressourcenallokation in der hausärztlichen Versorgung: eine empirisch-ethische Untersuchung*, Dissertation, LMU München: Medizinische Fakultät.
- Urt. LSG Sachsen-Anhalt (2013) v. 15.01.2014 - L 9 KA 5/12.
- Urt. BSG Juni (2013). <http://www.medical-tribune.de>: Amtsermittlungspflicht bei Praxisbesonderheiten.
- Urt. SG Dresden (2013) v. 11.12.2013, Az. S 18 KA 31/10, S 18 KA 71/10, S 18 KA 266/10, S 18 KA 268/10 und S 18 KA 269/10.
- Wersborg, T. (2006). *Morbiditätsbezogene Richtgrößen zur Steuerung einer bedarfsgerechten und wirtschaftlichen Arzneimittelversorgung innerhalb der gesetzlichen Krankenversicherung in Deutschland*, Dissertation, LMU München: Medizinische Fakultät.